

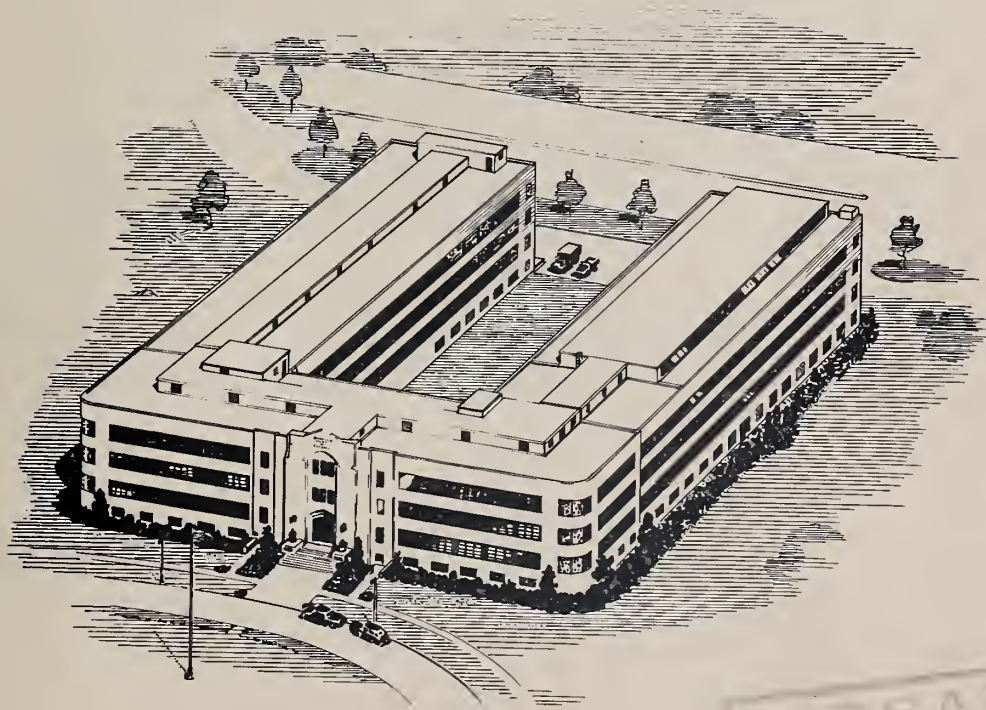
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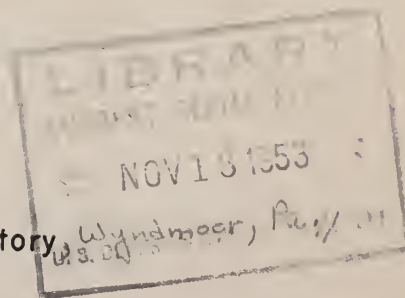
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UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Research Administration
U.S. Bureau of Agricultural and Industrial Chemistry.

3X LIST OF PUBLICATIONS AND PATENTS
of
ANIMAL FATS DIVISION 11X



5X Eastern Regional Research Laboratory,
Philadelphia 18, Pennsylvania.



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SEPTEMBER 1953

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UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH ADMINISTRATION
Bureau of Agricultural and Industrial Chemistry
Eastern Regional Research Laboratory
Philadelphia 18, Pennsylvania

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When a reprint is requested, give the number of the publication.

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Hydroxy acids were prepared in good yield from commercial and purified oleic acid and in fair yield from purified linoleic acid.
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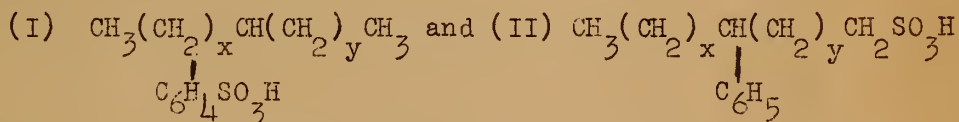
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are described. Certain properties of the intermediate and final products are also given.

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Eight esters of oleic acid, namely, vinyl, allyl, 2-chloroallyl, methallyl (2-methylallyl), crotyl, 1-buten-3-yl (1-methylallyl), furfuryl, and oleyl oleate, have been prepared in good yield, and some of their properties have been determined. The peroxide-catalyzed copolymerization of these esters with vinyl acetate, as well as their polymerization, has been studied.

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The thermal polymerization of the two isomeric 9,10-epoxystearic
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studied. Both isomers can be polymerized to the gel stage, although
linear polyester formation undoubtedly predominates. For the low-
melting isomer, reaction rate constants and activation energy have
been calculated. The polymers just prior to the gel stage are vis-
cous, colorless oils, soluble in many common organic solvents and
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Journal of the American Chemical Society, vol 70, p. 1235-1240,
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A reaction scheme is described which correlates the configurational
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This scheme is self-consistent and is in harmony with accepted theo-
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Society, vol. 25, p. 193-200, June 1948.
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ARYLSTEARIC ACIDS FROM OLEIC ACID. VARIABLES AFFECTING THE YIELD AND PROPERTIES. Journal of the American Oil Chemists' Society, vol. 25, p. 365-368, October 1948.
Twenty-five aromatic compounds were compared in the synthesis of arylstearic acids from oleic acid by the Friedel and Crafts reaction. Xylylstearic acid was the arylstearic acid obtained in the highest yield (92.4%), from technical m-xylene and commercial oleic acid. Oleic acid of about 95% purity did not improve the yield but resulted in nearly colorless, rather than yellow, viscous oils.
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Vinyl 2-chloroallyl, methallyl, allyl, 3-buten-2-yl, crotyl and furfuryl esters of caproic, caprylic, pelargonic, capric, lauric, myristic, palmitic, and stearic acids have been prepared, and some of their properties have been determined. Polymers, as well as copolymers with some reactive short chain olefinic monomers, have been prepared from the more reactive esters, particularly the vinyl esters.

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PROCESS FOR THE PREPARATION OF MONOETHENOIC ACIDS AND THEIR ESTERS. U. S. Patent No. 2,457,611, issued December 28, 1948.

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Methods of preparing oleamide and N-(n-alkyl) oleamides from methyl through hexyl and the even members from octyl through octadecyl have been studied, and the amides have been obtained in good yield. N-(2-hydroxyethyl) oleamide, N-acetyloleamide, and several representative N-aryloleamides and N-alkyl-9,10-dihydroxyoctadecanamides have also been prepared. Most of these amides have not been recorded in the literature; with few exceptions the others are purer than the corresponding products previously reported.
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EFFECT OF VARIOUS SURFACE-ACTIVE AGENTS ON THE PENETRATING POWER AND STABILITY OF CALCIUM HYPOCHLORITE AND BLEACHING POWDER SOLUTIONS. American Dyestuff Reporter, vol. 38, p. 455-458, June 13, 1949.
In concentrated calcium hypochlorite solutions, 0.5 percent of Tergitol 08 or 1 percent of Gardinol LS Paste contributed satisfactory penetrating properties. In concentrated bleaching powder solutions, 1 percent of Tergitol 08, Maccosol A, Novonacco, or Aerosol MA contributed satisfactory penetrating properties. When 2 percent or more of Ultrawet D-4, Sulfatate, or Alkanol S was used, they also were fairly satisfactory. Aerosol MA accelerated decomposition of hypochlorite ion. The Draves-Clarkson test was used for the determination of penetrating power.

- 354 Swain, Margaret L., and Brice, B. A.
FORMATION OF TRACES OF CONJUGATED TETRAENOIC AND TRIENOIC CONSTITUENTS IN AUTOXIDIZED LINOLENIC AND LINOLEIC ACIDS AND VEGETABLE OILS DURING ALKALI ISOMERIZATION. *Journal of the American Oil Chemists' Society*, vol. 26, p. 272-277, June 1949.

It has been shown that the low-intensity absorption bands characteristic of conjugated tetraenoic and trienoic fatty acids frequently encountered in the ultraviolet spectra of alkali-isomerized vegetable oils prepared by ordinary commercial or laboratory extraction techniques probably have their origin in oxidation products of linolenic and linoleic acid, respectively. Similar bands are found in the spectra of mildly autoxidized preparations of pure linolenic and linoleic acids after either alkali-isomerization or heating at 180° C. in neutral glycol. Tetraenoic and trienoic conjugation formed from oxidation products of linolenic and linoleic acids during alkali-isomerization can be differentiated from the tetraenoic and trienoic conjugation produced by alkali-isomerization of arachidonic and linolenic acids, respectively, by spectrophotometric examination of the sample after heating in neutral glycol. Equal amounts of conjugation are formed from the fatty acid oxidation products on heating and on alkali-isomerization, whereas no conjugation is obtained from arachidonic and linolenic acids on heating in the absence of alkali.

- 356 Swern, Daniel, Billen, Geraldine M., and Knight, H. B.
CHEMISTRY OF EPOXY COMPOUNDS. VIII. REACTION OF ALLYL ALCOHOL WITH UNSYMMETRICAL OXIRANE COMPOUNDS. AN ELECTRONIC INTERPRETATION. *Journal of the American Chemical Society*, vol. 71, p. 1152-1156, April 1949.

The reaction of allyl alcohol with the unsymmetrical oxirane compounds propylene oxide, glycidol, 3,4-epoxy-1-butene, epichlorohydrin, and styrene oxide, in the presence of acidic and alkaline catalysts, has been studied. Reaction conditions are described for obtaining good yields (60 to 90 percent) of hydroxy ethers, and electronic mechanisms for the reactions are proposed.

Publications

July - December

- 362 Ault, Waldo C., Brice, B. A., Swain, Margaret L., Schaeffer, B. B., and Copley, M. J.
POLYUNSATURATED FATTY ACID RETARDERS IN THE EMULSION POLYMERIZATION OF GR-S SYNTHETIC RUBBER. *Journal of the American Oil Chemists Society*, vol. 26, p. 700-704, December 1949.

This paper describes research on development of soaps from partially and selectively hydrogenated tallows for use as emulsifiers in the manufacture of synthetic rubber GR-S. Data are presented which served as a basis for specifications for suitable soap.

- 370 Jordan, E. F., Jr., and Swern, Daniel
PREPARATION OF SOME POLYMERIZABLE ESTERS OF 10-HENDECENOIC (UNDECYLENIC) ACID. *Journal of the American Chemical Society*, vol. 71, p. 2377-2379, July 1949.

Seven esters of 10-hendecenoic (undecylenic) acid were prepared in good yield from 10-hendecenoic acid or its methyl ester and the appropriate alcohol. Some of their properties were determined. The benzoyl peroxide-initiated polymerization of some of the esters and their copolymerization with vinyl acetate were studied briefly.

- 371 Knight, H. B., and Swern, Daniel
REACTIONS OF FATTY MATERIALS WITH OXYGEN. IV. QUANTITATIVE DETERMINATION OF FUNCTIONAL GROUPS. Journal of the American Oil Chemists' Society, vol. 26, p. 366-370, July 1949.
Conventional analytical procedures employed in oxidation reactions for the quantitative determination of functional groups were applied to a series of pure compounds, as well as to two synthetic mixtures and to methyl oleate hydroperoxide (estimated purity, 70 percent). In the absence of peroxide and oxirane groups, the analytical procedures are reliable. Techniques are described for the accurate determination of functional groups when peroxide and oxirane groups are present. A modified procedure for determination of carbonyl oxygen is presented.
- 380 Morris, Steward G., and Riemenschneider, R. W.
ANTIOXIDANT PROPERTIES OF POLYHYDROXYBENZOIC ACIDS AND THEIR ESTERS, AND OTHER NUCLEAR SUBSTITUTED POLYPHENOLS. Journal of the American Oil Chemists' Society, vol. 26, p. 638-640, November 1949.
This article reports the antioxidant properties of polyhydroxybenzoic acids and their esters, and other nuclear substituted polyphenols as determined by the active oxygen method and by baked cracker tests.
- 393 Riemenschneider, R. W., Herb, S. F., and Nichols, Peter L., Jr.
ISOLATION OF PURE NATURAL LINOLEIC AND LINOLENIC ACIDS AS THEIR METHYL ESTERS BY ADSORPTION FRACTIONATION ON SILICIC ACID. Journal of the American Oil Chemists' Society, vol. 26, p. 371-374, July 1949.
An effective procedure is described for fractionating methyl esters of oils rich in linoleic and linolenic acids by adsorption of silicic acid columns. Pure methyl linoleate from methyl esters of tobacco seed oil, and pure methyl linolenate from methyl esters of linseed and perilla oils were isolated by this procedure. These compounds were characterized by the usual physical and chemical constants and by spectrophotometric examination. These natural acid esters differed significantly from corresponding debromination acid esters in the intensity of ultraviolet absorption at their maxima under the conditions of the alkali isomerization spectrophotometric method of analysis.
- 396 Swern, Daniel
ORGANIC PERACIDS. Chemical Reviews, vol. 45, no. 1, p. 1-68, August 1949.
The literature on organic peracids is reviewed, with emphasis on their preparation, properties, and use as oxidizing agents for various classes of organic compounds. Approximately six hundred literature references are included.
- 397 Swern, Daniel
SOLUBILITY AND SPECIFIC ROTATION OF 1-ASCORBYL PALMITATE AND 1-ASCORBYL LAURATE. Journal of the American Chemical Society, vol. 71, p. 3256, September 1949.
The solubility of 1-ascorbyl palmitate in a series of typical organic solvents, water, and cottonseed and peanut oils was determined. The solubility of 1-ascorbyl laurate in these oils, and the specific rotation of both 1-ascorbyl palmitate and laurate were also determined.

- 398 Swern, Daniel, and Billen, Geraldine N.
CHEMISTRY OF EPOXY COMPOUNDS. X. POLYMERIZATION OF THE ISOMERIC
9,10-EPOXYOCTADECANOLS. Journal of the American Chemical Society,
vol. 71, p. 3849-3851, November 1949.
Thermal polymerization of the isomeric 9,10-epoxyoctadecanols, m.p.
54° and 48° C., respectively, at 60° to 140°, was investigated. Side
reactions, of which isomerization of the oxirane group to the carbonyl
group was the most important, precluded a kinetic analysis of the
polymerization. The average molecular weight of the polymers at zero
oxirane oxygen values was about 900, which corresponds to that of a
trimer.
- 399 Swern, Daniel, Stutzman, Jeanne M., and Roe, Edward T.
FATTY ACID AMIDES. II. AMIDES AS DERIVATIVES FOR THE IDENTIFICATION OF
SOME LONG-CHAIN UNSATURATED FATTY ACIDS. Journal of the American
Chemical Society, vol. 71, p. 3017-3019, September 1949.
N-(2-hydroxyethyl) and N-(n-dodecyl)linoleamides, ricinoleamides,
elaidamides and 10-hendecenamides, as well as the unsubstituted amides,
elaidamide and 10-hendecenamide, were prepared and characterized.
These amides are suitable derivatives for identification of the parent
unsaturated acids.
- 406 Witnauer, Lee P., Nichols, Peter L., Jr., and Senti, Frederic R.
ANALYSES OF MIXTURES OF t,t Δ 9,11- and t,t Δ 10,12-LINOLEIC ACIDS BY
X-RAY DIFFRACTION PATTERNS AND SOLIDIFICATION POINTS. Journal of
the American Oil Chemists' Society, vol. 26, p. 653-655, November
1949.
A method is reported for analyzing mixtures of t,t Δ 9,11- and t,t Δ
10,12-linoleic acids. X-ray diffraction patterns readily distinguish
the pure isomers and identify both components of a binary mixture if
it contains not less than 25 percent of the t,t Δ 10,12 isomer and not
less than 5 percent of the t,t Δ 9,11-isomer. The solidification
points of the acids and their mixtures were determined. The solidifi-
cation point in conjunction with the X-ray data defines the composi-
tion of any mixture to \pm 3 percent.

Patents

July - December

- Morris, Steward G., and Riemenschneider, Roy W.
ESTERS OF POLYHYDROXY-BENZOIC ACIDS. U. S. Patent No. 2,485,099,
issued September 27, 1949.
- Swern, Daniel
ETHERS OF 9,10-DIHYDROXYOCTADECANOL. U. S. Patent No. 2,491,533, issued
December 20, 1949.
- Swern, Daniel, and Dickel, Geraldine B.
COPOLYMERS OF UNSATURATED ESTERS OF 9,10-DIHYDROXYSTEARIC ACID. U. S.
Patent No. 2,475,557, issued July 5, 1949.
- Swern, Daniel, Scanlan, John T., and Findley, Thomas W.
HYDROXYLATION PROCESS. U. S. Patent No. 2,492,201, issued
December 27, 1949.

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Publications

January - June

- 409 Ault, Waldo C., and Wells, P. A.
ANIMAL FAT AND OIL RESEARCH. Dutchers' Advocate, vol. 127, no. 18,
p. 9, 10, and 23, May 3, 1950.
A brief review is presented of the organization of the oil and fat
work of the Laboratory and its relation to other research agencies.
This is followed by a discussion of the research program and accom-
plishments of the Eastern Regional Research Laboratory in the field
of animal fats.
- 421 Morris, S. G., Myers, J. S., Jr., Kip, Mary L., and Riemenschneider, R. W.
METAL DEACTIVATION IN LARD. Journal of the American Oil Chemists'
Society, vol. 27, p. 105-107, March 1950.
A number of compounds, including known synergists, amino acids, and
amines, were evaluated as deactivators for copper, iron, nickel and
tin in lard. Some were effective as deactivators for copper but
were relatively poor for iron. One compound was better for iron
than for copper. Ascorbyl palmitate, potassium ascorbyl palmitate,
and ascorbic, tartaric, citric and phosphoric acids were the most
effective metal deactivators. This deactivation may in part explain
the synergistic effect of these compounds with phenolic antioxidants.
The more powerful antioxidants, however, are generally poor metal
deactivators, and in the presence of traces of metallic pro-oxidants
become relatively ineffective unless metal deactivators are also
added.
- 438 Swern, Daniel, Knight, H. B. (ERRL) Shreve, O. D., and Heether, M. R.
(E. I. du Pont de Nemours and Company)
COMPARISON OF INFRARED SPECTROPHOTOMETRIC AND LEAD SALT-ALCOHOL
METHODS FOR DETERMINATION OF TRANS OCTADECENOIC ACIDS AND ESTERS.
Journal of the American Oil Chemists' Society, vol. 27, p. 17-21,
January 1950.
The infrared spectrophotometric method, previously described by the
authors, and the lead salt-alcohol method have been applied to a
variety of synthetic mixtures of known composition and to other
materials. Comparison of the data indicates that the infrared
method is more rapid, specific and accurate than the lead salt-
alcohol method. The infrared method is directly applicable to deter-
mination of trans isomers in acid or ester mixtures; it requires
only small samples and they can be recovered if necessary. This
method is suggested as a necessary tool to investigators conducting
research on the oxidation, isomerization, polymerization, composition
and hydrogenation of fats and their components and derivatives, and
on the preparation of pure unsaturated acids and esters.

- 441 Weil, J. K., Stirton, A. J., and Stawitzke, Anna A.
ALKYL Alpha-ACYLOXYACETATES AND PROPIONATES FROM SOAPS AND Alpha-HALOGENO ESTERS. Journal of the American Oil Chemists' Society, vol. 27, p. 187-189, May 1950.

Twenty-six methyl, ethyl and n-butyl α -acyloxyacetates and propionates were prepared, in which the acyl group was derived from undecylenic, lauric, myristic, palmitic, oleic, stearic and phenylstearic acids. The yield, distillation range, freezing point, refractive index, density, viscosity and viscosity index were recorded. Synthesis by the reaction of a soap with an alkyl α -halogeno ester gave higher yields and greater purity than acylation by acid chlorides. Conditions for the reaction were complete dryness of the reactants, absence of free acid in the alkyl α -halogeno ester, and reaction temperatures of 150-170°. Since most of the alkyl α -acyloxyacetates and propionates appeared to be compatible with ethyl cellulose and polyvinyl chloride, they will be evaluated as plasticizers.

Publications

July - December

- 458 Ault, W. C., Wells, I. A., and Stirton, A. J.
PROGRESS OF GOVERNMENT RESEARCH ON ANIMAL FATS. Proceedings of the Twenty-Third Annual Convention Soap & Glycerine Industry, held in New York City, January 1950.
The work of the Oil and Fat Division at the Eastern Regional Research Laboratory is discussed, with special emphasis on the work of the Surface Active Agent Section. Past accomplishments of this group are reviewed, and a general discussion of our present research program in this field is presented.
- 477 Knight, H. B., Koos, R. E., Jordan, E. F., Jr., and Swern, Daniel
COMPATIBILITY OF DERIVATIVES OF 9,10-DIHYDROXYSTEARIC ACID AND 9,10-DIHYDROXYOCTADECANOL WITH SOME COMMERCIAL POLYMERS. Journal of the American Oil Chemists' Society, vol. 27, p. 281-284, July 1950.
A study of compatibility with some commercial polymers is reported for some alkyl and alkenyl esters of low-melting 9,10-dihydroxystearic acid, 9,10-(10,9)-alkoxyhydroxyoctadecanols, esters of 9,10-(10,9)-alkoxyhydroxystearic acids, and two series of previously unreported compounds, namely, esters of the isomeric 9,10-dihydroxystearic acids with ether-alcohols and polymeric plasticizers prepared by the reaction of selected members of this group of new esters with phthalic anhydride. The most promising materials are methyl 9,10-(10,9)-methoxyhydroxystearate, esters of 9,10-dihydroxystearic acid with ethylene glycol monobutyl ether and ethylene glycol monobenzyl ether, and the polymeric plasticizers. The last-named group is compatible with polymers which differ widely in chemical structure.

- 483 Nichols, Peter L., Jr., Riemenschneider, R. W., and Herb, S. F.
KINETICS OF ALKALI ISOMERIZATION OF LINOLEIC, LINOLENIC, AND
ARACHIDONIC ACIDS. Journal of the American Oil Chemists' Society,
vol. 27, p. 329-336, September 1950.
A theory of alkali isomerization of linoleic, linolenic, and arachi-
donic acids is presented in which systematic classification of con-
current prototropic changes is introduced. The limited experimental
data available are correlated.
- 498 Roe, Edward T., and Swern, Daniel
DETERMINATION OF LONG-CHAIN HYDROXAMIC ACIDS. Analytical Chemistry,
vol. 22, p. 1160-1162, September 1950.
A procedure is described for determining long-chain hydroxamic acids.
It consists in hydrolysis to carboxylic acid and hydroxylamine
hydrochloride with a known excess of aqueous, alcoholic hydrochloric
acid, followed by titration of either the excess hydrochloric acid or
the hydroxylamine hydrochloride formed. The former technique gives
slightly low results; the latter, slightly high results. Hydroxyla-
mine hydrochloride cannot be titrated, however, in the presence of
fatty acids containing ten or fewer carbon atoms.
- 500 Shreve, O. D. and Heether, M. R., (Philadelphia Laboratory, E. I.
du Pont de Nemours & Company, Inc.), and Knight, H. B. and Swern,
Daniel (ERRL).
DETERMINATION OF trans-OCTADECENOIC ACIDS, ESTERS, AND ALCOHOLS IN
MIXTURES. Analytical Chemistry, vol. 22, p. 1261-1264, October 1950
An infrared spectrophotometric method, based on differences in ab-
sorption at 10.36 microns, is described for determination of trans
octadecenoic acids, esters (including glycerides), and alcohols in
the presence of the corresponding cis and saturated compounds.
Extinction coefficients at 10.36 microns are reported for seventeen
pure cis and trans monounsaturated and saturated acids, esters, and
alcohol.
- 501 Shreve, O. D. and Heether, M. R. (E. I. du Pont de Nemours & Company,
Inc., Philadelphia), and Knight, H. B. and Swern, Daniel (ERRL).
INFRARED ABSORPTION SPECTRA. SOME LONG-CHAIN FATTY ACIDS, ESTERS,
AND ALCOHOLS. Analytical Chemistry, vol. 22, p. 1498-1501,
December 1950.
Infrared absorption spectra from 2 to 15 microns have been presented
for a number of pure, long-chain, saturated and monounsaturated fatty
acids, methyl esters, tri-glycerides, and alcohols. Correlations of
absorption bands with molecular structure have been given for all
spectra. The spectra should be useful in the application of the
infrared method to studies involving fats and other long-chain systems.
- 503 Swern, Daniel, and Findley, Thomas W.
CHEMISTRY OF EPOXY COMPOUNDS. XII. CO-OXIDATION OF ALDEHYDES AND OLEIC
ACID, METHYL OLEATE OR OLEYL ALCOHOL. Journal of the American
Chemical Society, vol. 72, p. 4315-4316, September 1950.
Cooxidation of benzaldehyde, acetaldehyde or butyraldehyde and oleic
acid, methyl oleate or oleyl alcohol with air in the presence of
ultraviolet light was studied. Yields of 9,10-epoxy compounds of
15-40 percent were obtained.

- 504 Swern, Daniel, and Jordan, E. F., Jr.
VINYL LAURATE AND OTHER VINYL ESTERS. Organic Syntheses, vol. 30,
p. 106-109. 1950.
Laboratory procedures for the preparation of vinyl laurate, caproate,
caprylate, pelargonate, caprate, myristate, palmitate, stearate,
10-hendecenoate (undecylenate), and oleate are described.
- 510 Witnauer, Lee P. and Swern, Daniel.
X-RAY DIFFRACTION AND MELTING POINT-COMPOSITION STUDIES ON THE 9,10-
EPOXY- AND DIHYDROXYSTEARIC ACIDS AND 9,10-EPOXYOCTADECANOLS.
Journal of the American Chemical Society, vol. 72, p. 3364-3368,
August 1950.
X-ray diffraction and melting point-composition data are reported
for the isomeric 9,10-epoxy- and dihydroxystearic acids and the
isomeric 9,10-epoxyoctadecanols. The geometric configuration of the
isomeric 9,10-epoxyoctadecanols has been established from a study of
the x-ray diffraction data. By analogy, the configuration of the
isomeric 9,10-epoxystearic acids has also been established. Melting
point-composition data can be employed to analyze binary mixtures
of the isomeric 9,10-epoxyoctadecanols and epoxystearic acids with
an accuracy of ± 1 percent by weight. Corresponding data for the
isomeric 9,10-dihydroxystearic acids are of little value in analysis.
The composition of such mixtures, however, can be determined to ± 3
percent from the x-ray powder patterns.

Patents

July - December

- Swern, Daniel
COPOLYMERS OF UNSATURATED ETHERS. U. S. Patent No. 2,516,928,
issued August 1, 1950.
- Swern, Daniel, and Dickel, Geraldine B.
ESTERS OF OLEIC ACID WITH UNSATURATED ALCOHOLS. U. S. Patent
No. 2,527,597, issued October 31, 1950.

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Publications

January - June

- 511 Ault, Waldo C.
POTENTIAL NEW USES FOR ANIMAL FATS. American Meat Institute. Pro-
ceedings of the Third Conference on Research, p. 87-91, 1951.
New outlets for inedible animal fats that offer the greatest
potential rewards are discussed.

- 514 Brice, B. A., Ricciuti, C., Willits, C. O., Swain, M. L., and Ault, W. C.
RELATIONSHIP BETWEEN NICKEL CONTENT OF SOAP AND CONVERSION TO POLYMER
IN MANUFACTURE OF SYNTHETIC RUBBER (GR-S). Journal of the American
Oil Chemists' Society, vol. 28, p. 85-87, March 1951.
A number of soaps from hydrogenated fat stocks, representing soaps
having good and bad characteristics as emulsifiers in plant production
of GR-S, were analyzed for nickel, copper, and iron. A statistical
study of the data on polymerization and on metal content indicated
that variability in conversion was caused by variations in the metal
content of the soap.
- 525 Herb, S. F., Riemenschneider, R. W., and Donaldson, Jeanette
ISOLATION OF NATURAL ARACHIDONIC ACID AS ITS METHYL ESTER. Journal
of the American Oil Chemists' Society, vol. 28, p. 55-58,
February 1951.
Methyl arachidonate has been isolated in a high degree of purity from
beef suprarenal glands. The method consisted in chromatographing
on silicic acid followed by fractional distillation, thus avoiding
possible formation of isomers by chemical action. The ester has
been used in establishing standards for spectrophotometric analysis.
- 527 Knight, H. B., Eddy, C. Roland, and Swern, Daniel
REACTIONS OF FATTY MATERIALS WITH OXYGEN. VIII. CIS-TRANS ISOMERIZA-
TION DURING AUTOXIDATION OF METHYL OLEATE. Journal of the American
Oil Chemists' Society, vol. 28, p. 188-192, May 1951.
Methyl oleate, irradiated with ultraviolet, has been autoxidized at
35°, 70°, and 100°C. for 2000, 264 and 168 hours, respectively.
Samples were withdrawn at intervals and total oxygen introduced was
determined by chemical analysis for peroxide, carbonyl, hydroxyl,
oxirane, ester and carboxyl oxygen. Even with such a comparatively
simple substrate as methyl oleate, the autoxidation reaction is
exceedingly complex.
- 530 Nichols, Peter L., Jr., Herb, S. F., and Riemenschneider, R. W.
ISOMERS OF CONJUGATED FATTY ACIDS. I. ALKALI-ISOMERIZED LINOLEIC ACID.
Journal of the American Chemical Society, vol. 73, p. 247-252,
January 1951.
Considerable change in composition and properties of alkali-isomerized
linoleic acid was effected by mild treatment with iodine. Identi-
fication of the main product formed with an equal mixture of 9,11
linoleic acid and 10,12 linoleic acid shed further light on the
constitution of alkali-isomerized linoleic acid.

- 538 Shreve, O. D. and Heether, M. R. (E. I. du Pont de Nemours & Co., Inc.) and Knight, H. B., and Swern, Daniel (ERRL).
INFRARED ABSORPTION SPECTRA OF SOME HYDROPEROXIDES, PEROXIDES AND RELATED COMPOUNDS. Analytical Chemistry, vol. 23, p. 282-285, February 1951.
Infrared absorption spectra of a series of pure hydroperoxides, peroxides and related compounds from 2 to 15 microns were obtained and interpreted. On the basis of empirical analyses of the spectra of the hydroperoxides and their parent compounds, it was tentatively concluded that the hydroperoxide group gives rise to a characteristic absorption band near 12 microns. Study of the spectra of the peroxides, and additional peroxide spectra included in a commercially available catalogue of spectra, indicates that the peroxide linkage probably causes a strong absorption band in the 10 to 12 micron region but that the frequency corresponding to this band is sensitive to changes in the structure of the groups attached to the peroxide linkage.
- 539 Shreve, O. D. and Heether, M. R. (E. I. du Pont de Nemours & Co.), and Knight, H. B. and Swern, Daniel (ERRL).
INFRARED ABSORPTION SPECTRA OF SOME EPOXY COMPOUNDS. Analytical Chemistry, vol. 23, p. 277-282, February 1951.
Infrared spectra from 2 to 15 microns, with absorption maxima, are presented for 16 epoxy compounds including: (a) 3 oxirane derivatives of long-chain hydrocarbons, (b) 4 oxirane derivatives of lower molecular weight compounds; (c) oxirane derivatives of long-chain fatty acids, esters and alcohols, and (d) 3 epoxy compounds containing 5- and 6-membered rings. The spectra are discussed, and certain conclusions given.

Patents

January - June

Swern, Daniel

ETHER-ESTERS OF DIHYDROXYSTEARIC ACID. U. S. Patent No. 2,542,062, issued February 20, 1951.

Swern, Daniel, and Jordan, Edmund F., Jr.

UNSATURATED ESTERS OF 10-HEXDECENOIC ACID. U. S. Patent No. 2,541,126, issued February 13, 1951.

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- 550 Ault, Waldo C.
ANIMAL FATS AND OILS AS INDUSTRIAL RAW MATERIALS. Chemurgic Digest, vol. 10, p. 4-6, September 1951.
Animal fats and oils are discussed from the viewpoint of their use as industrial raw materials. Changes appearing in the pattern of their use are described, and new uses offering considerable promise for increasing and broadening the utilization of fats and their derivatives are pointed out.
- 551 Ault, Waldo C., Riemenschneider, Roy W., and Morris, Steward G.
MEAT FATS OF BETTER QUALITY. Crops in Peace and War, Yearbook of Agriculture 1950-1951, p. 671-676.
Discusses ways and means for production and processing of meat fats, particularly lard, having properties desired by American housewives.
- 558 Cording, James, Jr., and Shaines, Alfred
PREPILOT PLANT METHOD FOR CRYSTALLIZING FATS AND GREASES IN DRUMS. Journal of the American Oil Chemists' Society, vol. 28, p. 344-346, August 1951.
A method is described for the batch fractional crystallization of wool grease or fatty acids from solvents at reduced temperature, in which the 55-gallon drum is employed as a blender and crystallizer. The method is illustrative of prepilot plant operations for producing quantities of new products for industrial evaluation.
- 571 Herb, S. F., Witnauer, Lee P., and Riemenschneider, R. W.
ISOLATION OF EICOSAPENTAENOIC AND DOCOSAPENTAENOIC ACIDS FROM NATURAL SOURCES AS THEIR METHYL ESTERS BY ADSORPTION AND DISTILLATION TECHNIQUES. Journal of the American Oil Chemists' Society, vol. 28, p. 505-507, December 1951.
Methyl eicosapentaenoate and docosapentaenoate were isolated by adsorption and distillation techniques from the highly unsaturated esters of beef adrenal lipids. Specific extinction coefficients were determined under two conditions of alkali isomerization.
- 577 Knight, H. B., Coleman, Joseph E., and Swern, Daniel
REACTIONS OF FATTY MATERIALS WITH OXYGEN. IX. ANALYTICAL STUDY OF THE AUTOXIDATION OF METHYL OLEATE. Journal of the American Oil Chemists' Society, vol. 28, p. 498-501, December 1951.
Methyl oleate, irradiated with ultraviolet, was autoxidized at 35°, 70° and 100°C. for 2000, 264 and 168 hours, respectively. Samples were withdrawn at intervals, and total oxygen introduced was determined by chemical analysis for peroxide, carbonyl, hydroxyl, oxirane, ester and carboxyl oxygen. Even with such a comparatively simple substrate as methyl oleate, the autoxidation reaction is exceedingly complex.

- 588 Port, William S., Hansen, John E., Jordan, E. F., Jr., Dietz, T. J., and Swern, Daniel.
POLYMERIZABLE DERIVATIVES OF LONG-CHAIN FATTY ACIDS. IV. VINYL ESTERS. Journal of Polymer Science, vol. 7, p. 207-220, Aug. Sept. 1951.
Contrary to some literature reports, the vinyl esters of saturated fatty acids polymerize readily and rapidly. Vinyl oleate, when present in excess of 5 percent, and oxygen exert marked retarding effects. Techniques are described for the free-radical initiated polymerization of the vinyl esters of caprylic, capric, lauric, myristic, palmitic and stearic acids in bulk, dispersion, solution, and emulsion. Some data are given for polymerization in the presence of chain-transfer agents, such as carbon tetrachloride, dodecylmercaptan and ethylbenzene. Conditions are reported for obtaining degrees of polymerization from about 2 (when chain-transfer agents are employed) to 10,000 (weight average). The weight average degree of polymerization increases markedly as the conversion increases, particularly above 80 percent. Even up to extremely high conversions, soluble polymers are obtained in most cases. Solubility characteristics, transition point data, molecular weights (osmometric and light-scattering), and isolation and purification techniques are also reported.
- 589 Port, William S., O'Brien, James W., Hansen, John E., and Swern, Daniel
VISCOSITY INDEX IMPROVERS FOR LUBRICATING OILS. POLYVINYL ESTERS OF LONG-CHAIN FATTY ACIDS. Industrial and Engineering Chemistry, vol. 43, p. 2105-2107, September 1951.
Polyvinyl palmitate, polyvinyl caprylate, and copolymers of vinyl palmitate with vinyl acetate are effective viscosity index improvers for lubricating oils. The improvement in viscosity index caused by the copolymers increases with increased vinyl acetate content.
- 591 Roe, Edward T., Stutzman, Jeanne M., and Swern, Daniel
FATTY ACID AMIDES. III. N-ALKENYL AND N,N-DIALKENYL AMIDES. Journal of the American Chemical Society, vol. 73, p. 3642-3643, August 1951.
Fifteen N-alkenyl and N,N-dialkenyl amides have been prepared in good yield from allylamine, diallylamine, methallylamine and dimethallylamine and caprylic, capric, lauric, myristic, stearic and oleic acids. Several of the amides, notably those of myristic and stearic acids, are excellent derivatives for the characterization of the unsaturated amines. Data are reported on the sulfation and polymerization of certain of these amides.
- 593 Scanlan, John T.
SOME GOODS FROM WOOL GREASE. Crops in Peace and War. Yearbook of Agriculture 1950-1951, p. 863-868.
Several methods for recovery of wool grease are discussed. Uses for the recovered grease are outlined, and present knowledge regarding its chemical composition is reviewed. It is emphasized that additional information along composition lines is needed for substantially increased utilization.

- 597 Swern, Daniel, Ault, Waldo C., and Stirton, A. J.
ANIMAL FATS AND OILS IN INDUSTRY. Crops in Peace and War. Yearbook of Agriculture 1950-1951, p. 538-543.
Utilization of inedible animal fats for industrial purposes is discussed. An outline of present commercial uses for these fats is presented, and suggestions are given for development of new products having greater possible outlets.

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July - December

- Findley, Thomas W., and Swern, Daniel
PREPARATION OF EPOXY COMPOUNDS BY OXIDATION OF CIS-MONOOLEFINE COMPOUNDS. U. S. Patent No. 2,567,930, issued September 18, 1951.
- Scanlan, John T., Swern, Daniel, and Roe, Edward T.
AMIDES OF 9,10-EPOXYSTEARIC ACID. U. S. Patent No. 2,567,237, issued September 11, 1951.
- Swern, Daniel, and Findley, Thomas W.
EPOXIDIZED OILS. U. S. Patent No. 2,569,502, issued October 2, 1951.
- Swern, Daniel, Jordan, Edmund F., Jr., and Port, William S.
EMULSION POLYMERIZATION OF LONG-CHAIN VINYL ESTERS. U. S. Patent No. 2,562,965, issued August 7, 1951.
- Swern, Daniel, and Knight, Hogan B.
OXIDATION OF OLEIC ACID. U. S. Patent No. 2,572,892, issued October 30, 1951.

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January - June

- 629 Knight, H. B., Jordan, E. F., Jr., Roe, Edward T., and Swern, Daniel.
OLEIC ACID AND METHYL OLEATE. Biochemical Preparations, vol. 2, p. 100-104 (1952).
Large-scale laboratory procedures suitable for use in the preparation of pure oleic acid and methyl oleate are described.
- 636 Nichols, Peter L., Jr.
COORDINATION OF SILVER ION WITH METHYL ESTERS OF OLEIC AND ELAIDIC ACIDS. Journal of the American Chemical Society, vol. 74, p. 1091-1092, February 20, 1952.
The distribution of methyl oleate and methyl elaidate between isooctane and a solution of silver nitrate in aqueous methanol was measured. Coordination of silver ion with the cis-isomer was considerably greater, but only repeated extraction of isooctane-olefin solutions with silver nitrate could effect complete separation of the oleate and elaidate from a mixture. The possibility is envisioned of separating polyunsaturated fatty acid esters and of separating and classifying mixed glycerides with various degrees of unsaturation by an analogous process.

- 645 Riemenschneider, Roy W.
MEAT FATS FOR FRYING POTATO CHIPS. Potato Chipper, vol. 11, no. 11,
p. 42, 44, 46, June 1952.
Results of recent investigations on the use of antioxidants in meat
fats and blends of meat fats and vegetable fats for drying potato
chips are summarized.
- 646 Roe, Edward T., Stutzman, Jeanne M., Scanlan, John T., and Swern, Daniel
FATTY ACID AMIDES. IV. REACTION OF FATS WITH AMMONIA AND AMINES.
Journal of the American Oil Chemists' Society, vol. 29, p. 18-22,
January 1952.
Conditions were worked out for the quantitative conversion of oleo
oil, olive oil, castor oil, and tobacco seed oil to amides and
glycerol by reaction with liquid ammonia under pressure. Similarly,
methyl oleate was converted to oleamide in excellent yield. N-(2-
hydroxyethyl)- and N-(n-dodecyl) amides were also prepared by the
reaction of oleo oil with monoethanolamine and n-dodecylamine, re-
spectively, at atmospheric pressure. Crystallization of the amides
obtained from the various fats yielded oleamide (purity, 92 percent)
from olive oil, ricinoleamide (purity, > 95 percent) from castor oil,
and N-(2-hydroxyethyl) oleamide (purity, 90 percent) from oleo oil.
- 649 Stirton, A. J., Weil, J. K., Stawitzke, Anna A., and James, S.
SYNTHETIC DETERGENTS FROM ANIMAL FATS. DISODIUM ALPHA-SULFOPALMITATE
AND SODIUM OLEYL SULFATE. Journal of the American Oil Chemists'
Society, vol. 29, p. 198-201, May 1952.
Disodium alpha-sulfopalmitate prepared by the sulfonation of palmitic
acid with liquid sulfur trioxide is potentially inexpensive, has
adequate surface active properties, is a good detergent in hard and
soft water, but has limited solubility at room temperature (0.25
percent at 25° C.). Sodium oleyl sulfate prepared by sulfation of
oleyl alcohol with pyridine-sulfur trioxide has excellent solubility
and surface active properties and is an excellent detergent in soft
water. In hard water it is not so efficient, although it forms no
insoluble calcium salts. The future of these compounds will depend
on successful formulation with builders or combinations with soap or
other detergents.
- 650 Swern, Daniel, and Jordan, E. F., Jr.
METHYL RICINOLEATE. Biochemical Preparations, vol. 2, p. 104-105
(1952).
A large-scale laboratory procedure suitable for use in preparing
pure methyl ricinoleate is described.

- 651 Swern, Daniel, Knight, H. B., and Eddy, C. Roland.
TRANS-OCTADECENOIC ACID CONTENT OF BEEF FAT. ISOLATION OF ELAIDIC ACID FROM OLEO OIL. Journal of the American Oil Chemists' Society, vol. 29, p. 44-46, February 1952.
Infrared spectrophotometric examination of three samples of freshly rendered edible beef fat, and edible oleo oil and oleo stearine obtained from one of them, revealed the presence of substantial quantities (5 to 10 percent) of trans materials believed to be mainly, if not exclusively, monounsaturated. It was concluded that the trans components are neither minor nor adventitious constituents, but important naturally occurring components which may contribute to any unique properties that beef fat may have. Trans-9-octadecenoic (elaidic) and vaccenic acids were isolated from oleo oil, the former apparently for the first time.
- 652 Swern, Daniel, and Port, William S.
POLYMERIZABLE DERIVATIVES OF LONG-CHAIN FATTY ACIDS. VI. PREPARATION AND APPLICABILITY OF UREA COMPLEXES OF VINYL ESTERS. Journal of the American Chemical Society, vol. 74, p. 1738-1739, April 5, 1952.
Vinyl esters of long-chain fatty acids, such as vinyl pelargonate, laurate, palmitate, and stearate, form urea complexes in good to excellent yield (56 to 99 percent). The technique of urea complex formation was used to separate vinyl pelargonate from cross-linking contaminants and to recover monomeric vinyl palmitate from mixtures containing monomer, polymer, inhibitor, and other unknown impurities.
- 653 Swern, Daniel, Witnauer, Lee P., and Knight, H. B.
CHEMISTRY OF EPOXY COMPOUNDS. XIII. UREA COMPLEX FORMATION IN DETERMINING THE CONFIGURATIONS OF THE 9,10-DIHYDROXYSTEARIC ACIDS. Journal of the American Chemical Society, vol. 74, p. 1655-1657, April 5, 1952.
It was shown that the hydroxyl groups in the high-melting isomer are on opposite sides of the chain, whereas in the low-melting isomer they are substantially on the same side. This information confirms the fact that hydroxylation with potassium permanganate proceeds by cis or normal addition and that opening of the oxirane ring of the isomeric 9,10-epoxystearic acids involves an inversion.

Patents

January - June

- Ault, Waldo C., Nutting, George C., and Weil, James K.
ESTERS OF POLYHYDROXY-BENZOIC ACIDS AND METHOD FOR THEIR PREPARATION. U. S. Patent No. 2,595,221, issued May 6, 1952.
- Port, William S., Jordan, Edmund F., Jr., and Swern, Daniel
SEPARATION OF VINYL ESTERS OF LONG CHAIN FATTY ACIDS FROM THE CORRESPONDING FREE FATTY ACIDS. U. S. Patent No. 2,586,860, issued February 26, 1952.

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- 666 Brice, B. A., Swain, M. L., Herb, S. F., Nichols, P. L., Jr., and Riemenschneider, R. W.
STANDARDIZATION OF SPECTROPHOTOMETRIC METHODS FOR DETERMINATION OF POLYUNSATURATED FATTY ACIDS USING PURE NATURAL ACIDS.
Journal of the American Oil Chemists' Society, vol. 29, p. 279-287, July 1952.
Spectrophotometric methods of analysis of natural fats and oils have been restandardized for several conditions of alkali-isomerization using purified methyl esters of linoleic, linolenic, and arachidonic acids prepared by physical rather than chemical means. Application of the revised methods to a wide selection of oils and fats shows substantially higher accuracy than was obtained using standards prepared by debromination procedures.
- 668 Coleman, Joseph E., Knight, H. B., and Swern, Daniel
REACTIONS OF FATTY MATERIALS WITH OXYGEN. XII. NEW METHOD FOR CONCENTRATING LONG-CHAIN PEROXIDES. Journal of the American Chemical Society, vol. 74, p. 4886-4889, October 5, 1952.
By precipitation of the non-peroxidic portion of methyl oleate autoxidation mixtures (containing 4-37% peroxides) as urea complexes, concentrates containing 70-90% peroxides have been isolated from the filtrate in 50-95% yields. The three isolation techniques developed are applicable on a large laboratory scale, no specialized equipment or chemicals are required, temperatures in the range of room temperature to the boiling point of methanol are employed, and the procedures are readily duplicated. A preliminary study has indicated that the new techniques are applicable to the concentration of peroxides from autoxidized methyl elaidate and polyunsaturated acids.
- 674 Herb, S. F., and Riemenschneider, R. W.
INFLUENCE OF ALKALI CONCENTRATION AND OTHER FACTORS ON THE CONJUGATION OF NATURAL POLYUNSATURATED ACIDS AS DETERMINED BY ULTRAVIOLET ABSORPTION MEASUREMENTS. Journal of the American Oil Chemists' Society, vol. 29, p. 456-461, November 1952.
Optimum conditions for production of maximum conjugation of methyl arachidonate were determined. These comprise heating the sample in 21 percent KOH glycol for 15 minutes at 180° C. Optimum conditions of isomerization have also been applied to methyl linoleate, methyl linolenate, methyl eicosapentaenoate, and docosapentaenoate, which were prepared by physical methods. These conditions greatly increased the sensitivity of the spectrophotometric method for all the polyunsaturated acids except linoleic, for which the sensitivity was unchanged.

- 678 Knight, H. B., Witnauer, Lee P., Coleman, Joseph E., Noble, Wilfred R., Jr., and Swern, Daniel.
DISSOCIATION TEMPERATURES OF UREA COMPLEXES OF LONG-CHAIN FATTY ACIDS, ESTERS, AND ALCOHOLS. A NEW CHARACTERIZATION TECHNIQUE. Analytical Chemistry, vol. 24, p. 1331-1334, August 1952.
Urea complexes have been prepared in high yield from forty-two long-chain fatty acids, methyl and vinyl esters, and alcohols, a mono- and diglyceride and a vinyl ether. These include several cis-trans pairs and some long-chain compounds with oxygen-containing functional groups in the chain. With only a few exceptions, the dissociation temperature of each of these complexes has been determined. The dissociation temperature, which is the temperature at which opacity first occurs when a transparent crystal of urea complex is slowly heated, is characteristic for each complex and can be readily duplicated ($\pm 1.5^\circ$).
- 681 Morris, S. G., Gordon, C. F., Brenner, N., Meyers, J. S., Jr., Riemenschneider, R. W., and Ault, W. C.
FRACTIONATION OF ANIMAL FAT GLYCERIDES BY CRYSTALLIZATION FROM ACETONE. AN IMPROVED LARD OIL. Journal of the American Oil Chemists' Society, vol. 29, p. 441-443, November 1952.
Conditions have been investigated for separating various edible and inedible grades of animal fats, such as lard, grease, tallow and selectively hydrogenated greases and tallows into "oils" and "stearins" by means of crystallization from acetone.
- 686 Port, William S., Jordan, E. F., Jr., Hansen, John E., and Swern, Daniel.
POLYMERIZABLE DERIVATIVES OF LONG-CHAIN FATTY ACIDS. VII. COPOLYMERIZATION OF VINYL ACETATE WITH SOME LONG-CHAIN VINYL ESTERS. Journal of Polymer Science, vol. 9, p. 493-502, December 1952.
A study was made of the copolymerization of vinyl acetate with vinyl palmitate, vinyl stearate, and vinyl oleate, respectively. True copolymerization was shown to have occurred on the basis of the solubility characteristics of the crude copolymers over a wide range of compositions. The monomer reactivity ratios for the comonomers vinyl palmitate (r_1) and vinyl acetate (r_2) were determined by two methods. One, based on an analysis of the copolymer, gave $r_1 = 0.78 \pm 0.10$ and $r_2 = 1.15 \pm 0.13$; the other, based on an analysis for each monomer in the mixture remaining after polymerization, gave $r_1 = 0.66 \pm 0.07$ and $r_2 = 0.84 \pm 0.10$.

When the vinyl palmitate or vinyl stearate content of the copolymer exceeded about 20-25 mole percent, the copolymers exhibited first-order transition points, which were determined using a refractive index technique as well as a polarizing microscope method. Where no transition point could be observed, brittle point measurements were made.
- 691 Roe, Edward T., Miles, Thomas D. and Swern, Daniel.
FATTY ACID AMIDES. V. PREPARATION OF N-(2-ACETOXYETHYL)-AMIDES OF ALIPHATIC ACIDS. Journal of the American Chemical Society, vol. 74, p. 3442-3443, July 5, 1952.
A general method is described for the preparation in high yield of N-(2-acetoxyethyl)-amides from N-(2-hydroxyethyl)-amides by reaction with acetic anhydride.

- 696 Schweigert, B. S., Siedler, A. J., Dugan, L. R., Jr., and Neumer, J. F. (American Meat Institute Foundation).
USE OF INEDIBLE FATS IN DRY DOG FOODS AND POULTRY RATIONS.
A.M.I.F. Bulletin No. 15, p. 3-11, October 1952.
Nutritional investigations showed that growth rate and food utilization of dogs and broilers fed typical commercial rations, to which choice white grease was added at different levels up to 8 percent, was equal to, or slightly superior to, those observed when the control basal ration was fed. Antioxidants incorporated in the fats that were added to the rations, was shown to be of value in retarding the loss of vitamin A in the feeds during the storage.
- 699 Stirton, A. J.
RAW MATERIALS FOR SOAP. SATURATED AND UNSATURATED FATS. Journal of the American Oil Chemists' Society, vol. 29, p. 432-435, November 1952.
A review of the composition of the animal fats, lauric acid oils, vegetable oil foots and hydrogenated marine oils used in soap making, and the necessity for blending the raw materials.
- 700 Swern, Daniel, and Findley, Thomas W.
CHEMISTRY OF EPOXY COMPOUNDS. XIV. REACTION OF CIS-9,10-EPOXYSTEARIC ACID WITH AMMONIA AND AMINES. Journal of the American Chemical Society, vol. 74, p. 6139-6141, December 5, 1952.
The reaction of cis-9,10-epoxystearic acid, m.p. 59.5°, with ammonia, methalamine, ethylamine, dimethylamine, diethylamine and aniline has been studied. The oxirane ring is readily opened, and unsubstituted or substituted aminohydroxystearic acids are obtained. Potentiometric titration in the absence and presence of formaldehyde shows that, with the exception of the product from cis-9,10-epoxystearic acid and aniline, they exist in solution as typical amino acid salts. Some of the substituted products show surface activity.
- 701 Swern, Daniel and Parker, Winfred E.
APPLICATION OF UREA COMPLEXES IN THE PURIFICATION OF FATTY ACIDS, ESTERS, AND ALCOHOLS. I. OLEIC ACID FROM INEDIBLE ANIMAL FATS. Journal of the American Oil Chemists' Society, vol. 29, p. 431-434, October 1952.
Urea complex formation has been employed in the preparation of purified oleic acid (oleic acid content, 80-95%) from various grades of inedible animal fats and red oils. Since the urea complex of oleic acid forms in good yield at room temperature, low temperatures are not required in the isolation procedure. Yields of oleic acid are equal to or lower than those obtained by conventional low-temperature crystallization procedures, but the preparation of a polyunsaturate-free oleic acid is apparently not possible by urea complex formation alone. The separation of polyunsaturated acids from oleic acid by urea complex formation is more convenient than, but not as efficient as, by solvent crystallization but separation of saturated acids from unsaturated acids is less convenient.
- Advantages and disadvantages in using urea in the preparation of purified oleic acid are briefly discussed.

702 Swern, Daniel and Parker, Winfred E.

APPLICATION OF UREA COMPLEXES IN THE PURIFICATION OF FATTY ACIDS, ESTERS, AND ALCOHOLS. II. OLEIC ACID AND METHYL OLEATE FROM OLIVE OIL. Journal of the American Oil Chemists' Society, vol. 29, p. 614-615, December 1952.

Oleic acid and methyl oleate of high purity (97-99%) and substantially free (0.2% or less) of polyunsaturated contaminants have been isolated in 60-70% yield from the fatty acids or methyl esters of olive oil by procedures which require only one precipitation of urea complexes (single dose of urea technique), one low-temperature crystallization and one fractional distillation. The urea complex separation technique can be applied directly to olive oil methanolysis reaction mixtures without prior isolation of the mixed methyl esters.

Oleic acid or methyl oleate obtained by decomposition of urea complexes contains approximately one percent of polyunsaturated contaminants. After fractional distillation or crystallization to separate saturated acids the oleic content is about 90-97%. Such products are satisfactory for many uses and in their preparation low-temperature (-50° or lower) crystallizations are not required.

Solution and slurry techniques have been studied for the preparation of urea complexes from olive oil acids or esters. The former technique is preferred when a maximum of about one thousand grams of acids or esters are to be processed. The latter is preferred for larger size experiments mainly because the volume of methanol employed is cut in half, the time is shorter, and also because yields are about five percent higher.

Patents

July - December

Swern, Daniel, Roe, Edward T., and Scanlan, John T.

AMIDES OF 9,10-DIHYDROXYSTEARIC ACID. U. S. Patent No. 2,605,270 issued July 29, 1952.

Roe, Edward T. and Swern, Daniel

METHOD OF PRODUCING AMIDES. U. S. Patent No. 2,608,562 issued August 26, 1952.

Knight, Hogan B.

POLYMERIC PLASTICIZERS. U. S. Patent No. 2,613,157 issued October 7, 1952.

